



NEW HAMPSHIRE

ASTHMA BURDEN

REPORT

State of New Hampshire
Department of Health and Human Services
Division of Public Health Services
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Healthy Homes and Environments Section
Asthma Control Program
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ASTHMA CONTROL PROGRAM

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SURVEY/FEEDBACK

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6 Million children in the United States have asthma

INTRODUCTION AND BACKGROUND

Asthma is a chronic, inflammatory lung condition that affects over 20 million adults and 6 million children in the United States, according to 2016 estimates.¹ Characterized by wheezing, coughing, and shortness of breath, asthma can take a significant toll on individuals and their families. Not only can the condition be life-threatening, it can also limit physical activity, cause increased school and work absenteeism, and require expensive medical treatment. In fact, experts estimate asthma costs the US economy over \$80 billion each year in direct medical expenses, missed work and schools days, and deaths.² Understanding the burden of asthma in the US and New Hampshire, as well as ensuring all people with asthma have the resources and knowledge to keep their condition under control, can help minimize the impacts of this lifelong condition.

There is no single cause of asthma; both genetic and environmental factors contribute to its onset. While a family history of asthma may be a strong indicator that someone could develop asthma, factors such as allergies, tobacco use or exposure, obesity, pollution, and chemical exposure can increase the risk of developing asthma in both children and adults.

Though there is currently no cure, a person with asthma can live a healthy life by keeping their asthma well-controlled. Clinical asthma management is guided by the [National Heart, Blood, and Lung Institute Expert Panel Review 3 Guidelines for the Diagnosis and Management of Asthma](#)(the *Guidelines*).³ This document lays out three major goals:

1. Reduce any harm asthma may cause.
2. Reduce the risk of negative effects from asthma medication.
3. Reduce the risk of negative effects of future asthma symptoms.

Clinicians aim to achieve these goals through medication and the avoidance of triggers. Triggers are things that can cause asthma attacks (also referred to as episodes or exacerbations) – instances of asthma symptoms due to increased swelling, mucus secretion, and muscle constriction in the airways.



Preventing asthma attacks involves avoiding triggers, taking controller medications, and completing a written Asthma Action Plan

Every person's asthma triggers are different, and learning to identify and avoid them is part of each individual's successful asthma management. However, common triggers include allergens, pollen, smoke, dust, mold, poor air quality, pets, cold air, exercise, illness, chemicals/fragrance, and strong emotions. Asthma medication comes in two types: medicine taken daily to control symptoms (controller medications), and medicine taken to relieve asthma symptoms once they occur (quick-relief or rescue medications). The *Guidelines* recommend documenting medication regimens and triggers in a written Asthma Action Plan, which can help patients and caretakers keep up with the daily management of asthma.

Advocates across the country can help minimize the impact of asthma by promoting the use of the *Guidelines*, educating patients and families about asthma management, and raising awareness. In this report, the New Hampshire Asthma Control Program aims to do just that by providing the most recent data about the distribution of asthma, as well as its contributing factors, disparities, and impact on patients and families. Information presented here comes from national and state datasets gathered between 2011 and 2017, namely the Behavioral Risk Factor Surveillance System (BRFSS), the Youth Risk Behavior Surveillance System (YRBSS), and New Hampshire Hospital Discharge Data (NH HDD).

Data is also represented in both age-specific and age-adjusted rates. An age-specific rate represents the rate for a specific age group, for example ages 5-9, and can be compared to age-specific rates for other age groups. Age-adjusted rates, however, are summary measures of the entire population that control for age differences. These rates allow for comparison between two geographic areas with different age demographics, for example Coos County vs. Merrimack County. Measures of significance have been determined using 95% confidence intervals (CI) of estimates; that is, the difference between two numbers is considered statistically significant if their CIs, or the range in which we can be confident the actual number falls 95% of the time, do not overlap. When estimates of asthma are different but their CIs overlap, we can still compare them, but we cannot say definitively that asthma is more prevalent in one place, year, or population over the other.

Using this data for grant writing, program planning, evaluation, or baseline setting, the New Hampshire Asthma Control Program hopes its partners can become informed and empowered to use a data-driven approach to drive local public health action.

ASTHMA IN NEW HAMPSHIRE

ASTHMA AMONG CHILDREN



Data capturing the burden of asthma among children (ages 0-17 years) is collected through the Behavioral Risk Factor Surveillance System (BRFSS)⁴, a random telephonic survey that includes questions asking parents about the asthma status of their children. In 2015, the prevalence of asthma in children in New Hampshire was 7.2%, or approximately 18,000 children, which was not significantly different from the national average of 8.4%.⁵ As shown in **Table 1** and **Figure 1**, this number indicates a decrease in childhood asthma prevalence in New Hampshire from 2012 to 2015. However, due to the small sample size, this decrease is not statistically significant. Youth asthma can also be captured using the Youth Risk Factor Behavior Surveillance System (YRBSS),⁶ a survey of high school students that includes questions regarding asthma diagnosis. Data from 2011 to 2015 in **Figure 2** suggests a downward trend in the percentage of high school students who have ever been told they have asthma, from 26.1% in 2011 to 22.3% in 2015. While BRFSS data captures those

who currently have asthma (“current asthma”), YRBSS data points represent high school students who have ever been told they have asthma, even if they are not currently experiencing symptoms (“lifetime asthma”). Combined, these numbers indicate that asthma prevalence in New Hampshire children may be declining.

FIGURE 1

Current Asthma Prevalence in Children (ages 0-17 years), BRFSS 2012-2015

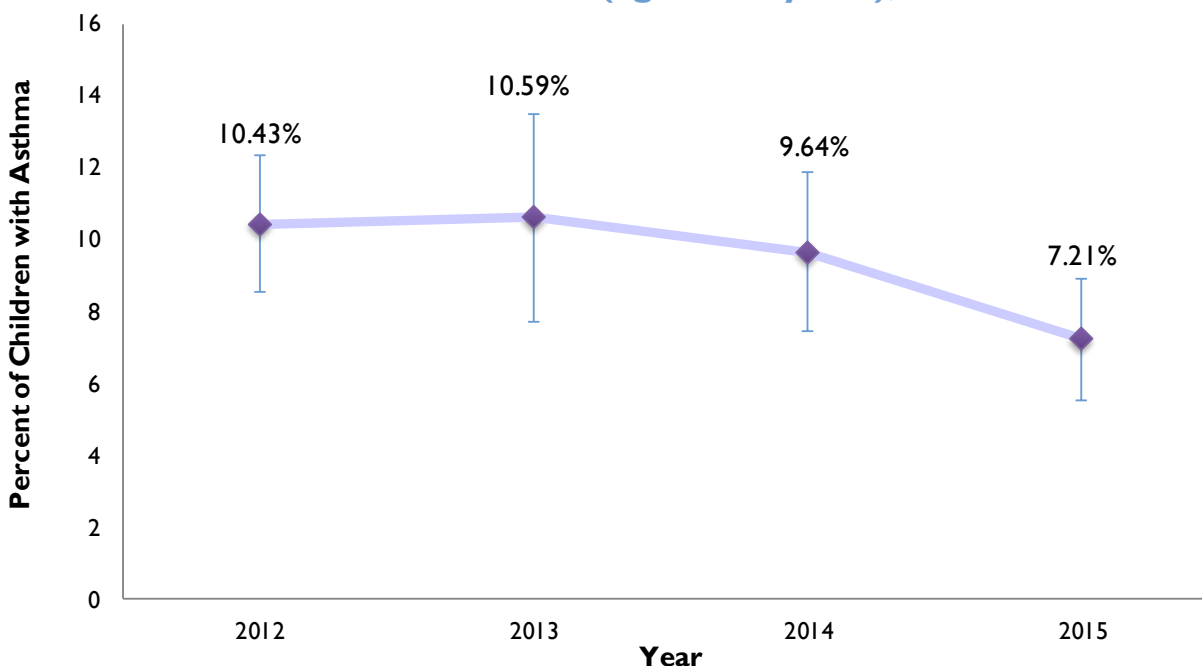
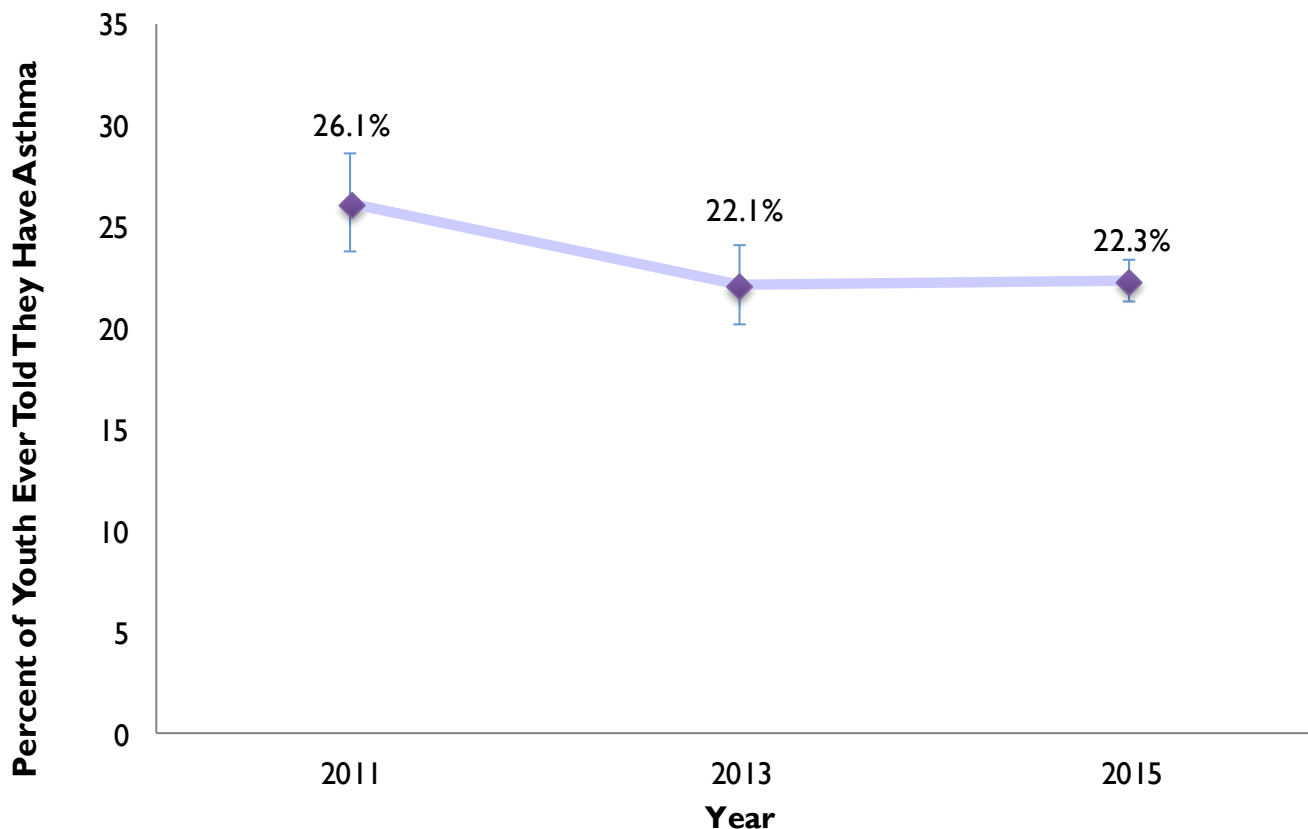


FIGURE 2**Youth Lifetime Asthma, High School Grades 9-12, YRBSS 2011-2015****TABLE 1: Childhood Asthma Prevalence Data
BRFSS 2012-2015; YRBSS 2011-2015**

BRFSS Data: Answered yes to both “Has a doctor, nurse or other health professional ever said that the child has asthma?” and “Does the child still have asthma?”

Year	Percent	95% C.I.
2012	10.43	8.55-12.31
2013	10.59	7.7-13.48
2014	9.64	7.41-11.86
2015	7.21	5.53-8.89

YRBSS Data: Answered yes to “Has a doctor or nurse ever told you that you have asthma?”

Year	Percent	95% C.I.
2011	26.1	23.8-28.6
2013	22.1	20.2-24.1
2015	22.3	21.3-23.4

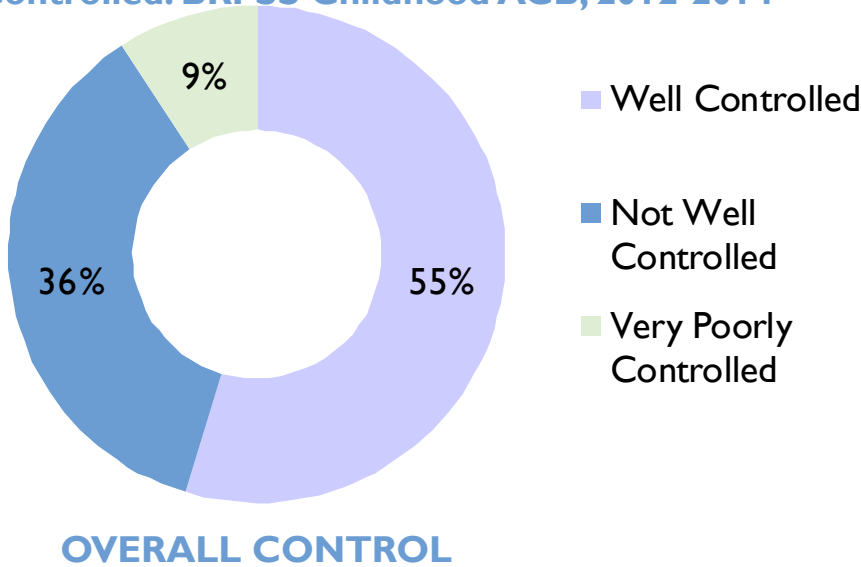


While asthma is a chronic, lifelong condition, patients can work with their medical providers to keep their asthma under control, enabling them to live normal, healthy lives. The *Guidelines* define asthma control as the degree to which asthma symptoms, functional limitations, and risks of adverse effects are minimized, and how well the goals of treatment are met.⁷ Level of control serves as a good approximation for the impact of asthma on patients' lives, and is measured through three categories on the BRFSS Childhood Asthma Callback Survey (ACB).⁸ This elective portion of the BRFSS survey asks parents to answer further questions regarding their child's condition, including:

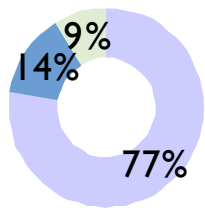
- Nighttime awakenings from asthma symptoms within the last 30 days
- Use of Short-Acting Beta Agonist, or SABA (rescue) medications in the last three months
- Days with asthma symptoms in the last 30 days

These measures are then combined depending on the patient's age and criteria determined by the *Guidelines* to describe overall asthma control, depicted in **Figure 3** with control responses for each specific measure. From 2012-2014, just over half (55%) of children with asthma had their asthma well controlled.

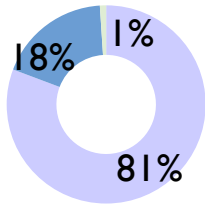
FIGURE 3
Percentage of Asthma Control Among Children Well Controlled, Not Well Controlled, Very Poorly Controlled. BRFSS Childhood ACB, 2012-2014



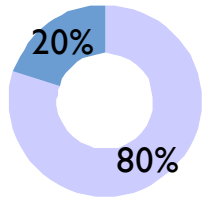
USE OF SABA MEDICATION



NIGHTTIME AWAKENINGS



SYMPTOM CONTROL



ASTHMA AMONG CHILDREN - KEY FINDINGS

- 7.2% or approximately 18,000 New Hampshire children reported having asthma in 2015, which is not significantly different from the national average.
- Both BRFSS and YRBSS suggest a downward trend in the prevalence of childhood asthma in New Hampshire between 2011 and 2015.
- Just over half (55%) of children with asthma in New Hampshire have it well-controlled.

ASTHMA AMONG ADULTS

Over the past several years, New Hampshire has seen consistently higher rates of adult asthma (ages 18+ years) in comparison to the rest of the country. In fact, from 2014-2016, the National Health Interview Survey identifies New Hampshire as the state with the highest adult prevalence of asthma in the country.⁹ In 2017, BRFSS data indicates that 13.2% of adults in New Hampshire, or approximately 143,000 people, had current asthma. As portrayed in **Figure 4** and **Table 2**, these numbers demonstrate a significant increase in adult asthma prevalence over the last several years. In addition, as shown in **Figure 5**, asthma rates in New Hampshire are higher in adult women (16.1%) compared to adult men (10.1%).

FIGURE 4
Current Asthma Prevalence in Adults (Ages 18+), BRFSS 2011-2017

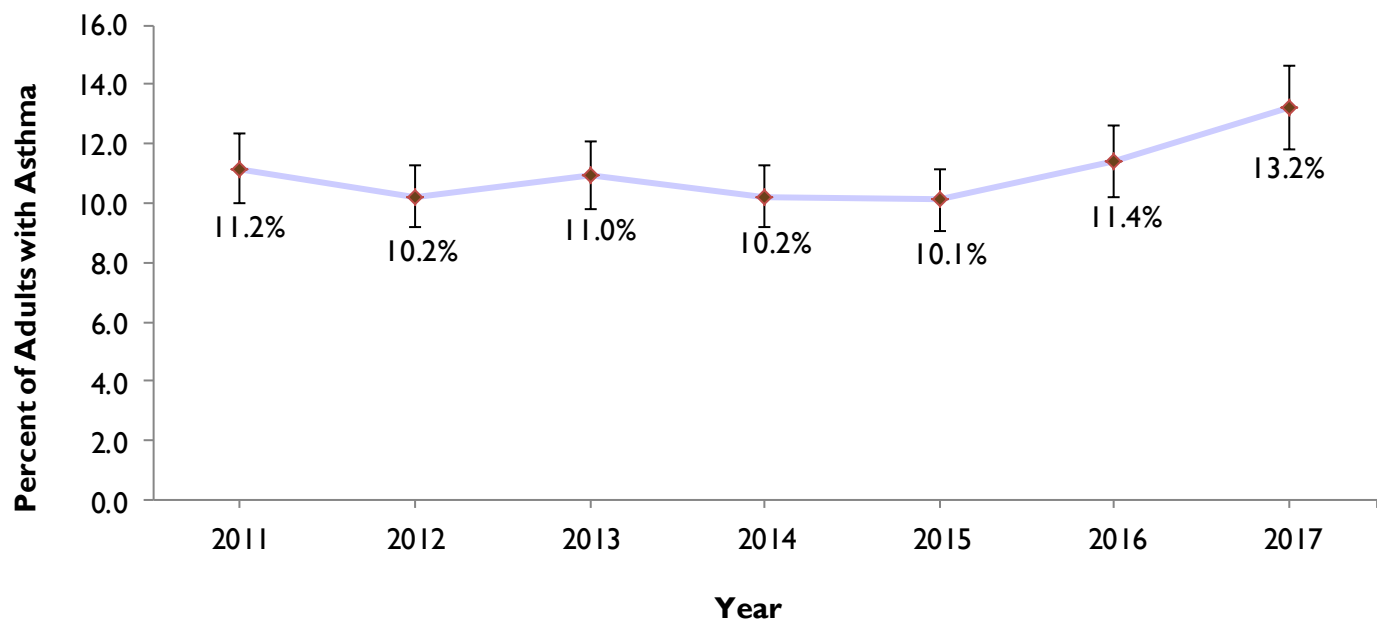
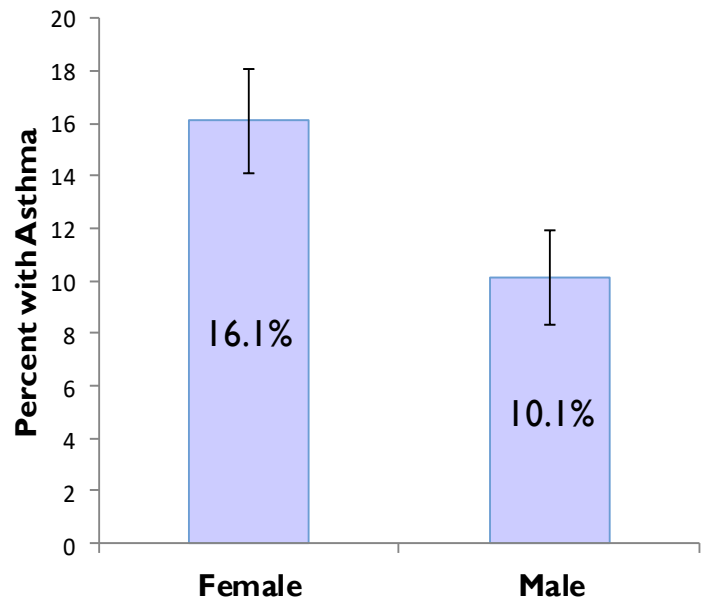


TABLE 2: Current Asthma Prevalence in Adults, BRFSS 2011-2017

Answered yes to both “Has a doctor, nurse or other health professional ever told you that you have asthma?” and “Do you still have asthma?”

Year	Percent	95% CI
2011	11.2	10.0-12.3
2012	10.2	9.2-11.3
2013	11.0	9.8-12.1
2014	10.2	9.2-11.3
2015	10.1	9.1-11.2
2016	11.4	10.2-12.6
2017	13.2	11.8-14.6

FIGURE 5
Adult Asthma Prevalence by Sex, BRFSS 2017



As shown in **Map 1** and **Table 3**, the prevalence of adult asthma differs by geographic location. In 2017, Coos County had the highest rate of adult asthma in the state (16.2%), followed closely by Sullivan County (15.7%) and Carroll County (15.4%). The city of Nashua had the lowest estimated burden of adult asthma (10.7%), followed by Cheshire County (11.3%) and Merrimack County (11.8%). However, while the estimates for each county are different, due to the small sample size of the BRFSS survey, all confidence intervals overlap, meaning there are no statistically significant differences between counties or when comparing them to the state average of 13.2%. Therefore, while we can compare county estimates, we cannot say definitively that asthma is significantly more prevalent in one county over another.

TABLE 3: Adult Asthma Prevalence by County with Manchester and Nashua,

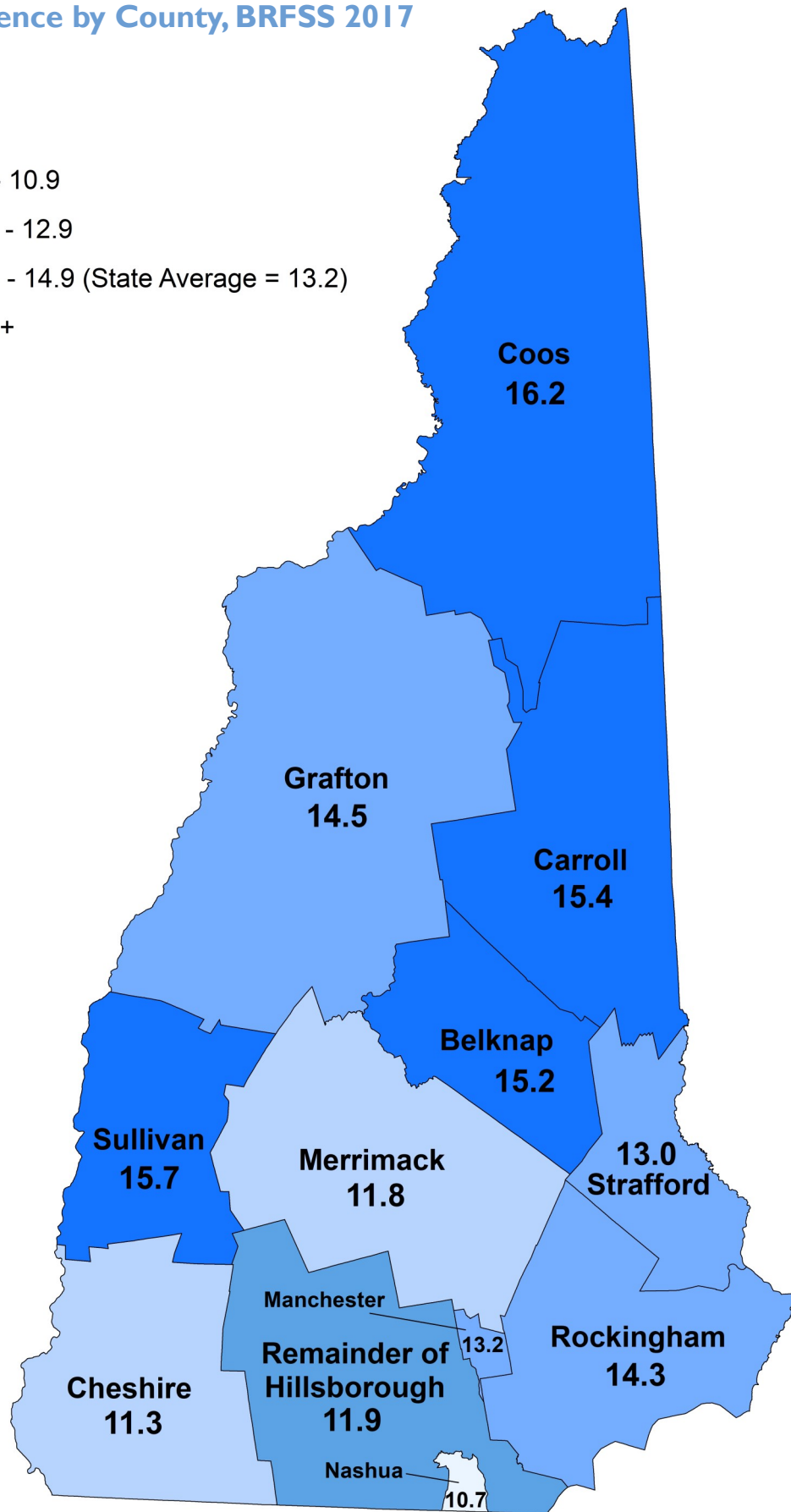
Region	Adult Asthma Prevalence (%)	95% C.I.
Coos	16.2	10.5-21.8
Sullivan	15.7	9.9-21.5
Carroll	15.4	9.8-21.0
Belknap	15.2	8.9-21.5
Grafton	14.5	9.3-19.8
Rockingham	14.3	11.0-17.7
Manchester	13.2	7.9-18.6
Strafford	13.0	8.7-17.3
Hillsborough (without Manchester and Nashua)	11.9	8.2-15.7
Merrimack	11.8	8.0-15.6
Cheshire	11.3	7.7-15.0
Nashua	10.7	5.3-16.0
State Average	13.2	11.8-14.6



MAP I

Adult Asthma Prevalence by County, BRFSS 2017

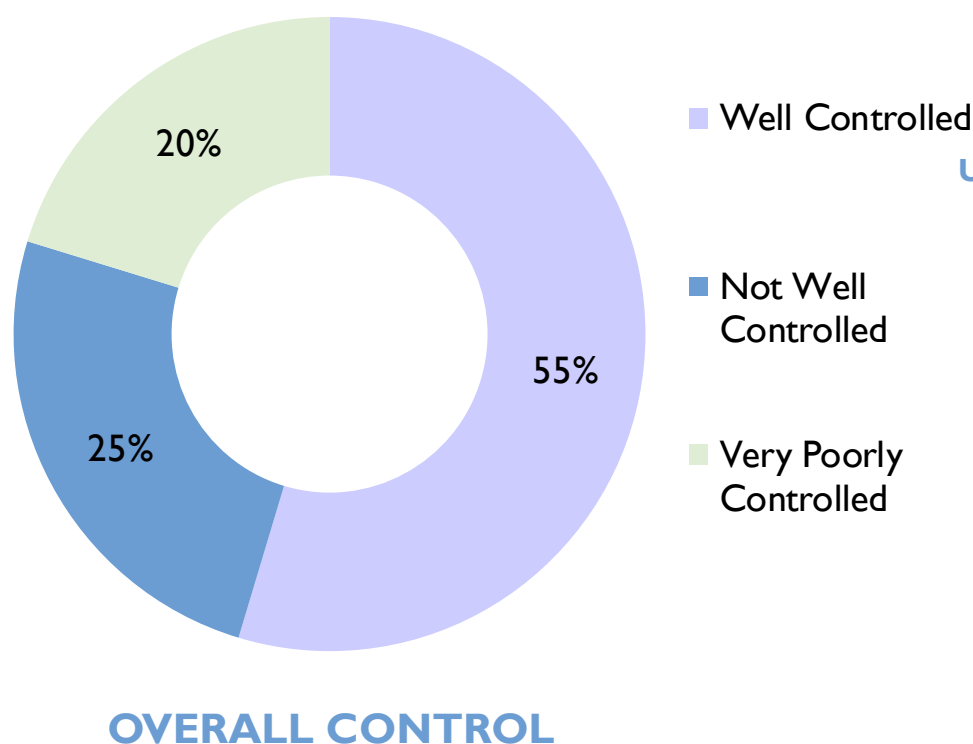
Percent



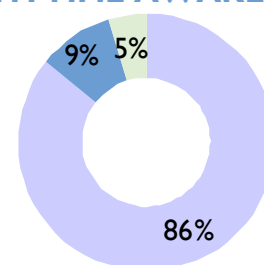
Asthma control in adults is measured similarly as in children, as a combined assessment of nighttime awakenings in last 30 days, use of Short-Acting Beta Agonist (SABA/rescue) medication in last three months, and days with symptoms in last 30 days. The level of control for these measures are collected through the BRFSS Asthma Callback Survey (ACB) which, similar to its childhood counterpart, allows BRFSS respondents with asthma to answer additional questions about their condition. As shown in **Figure 6**, just over half of adults with asthma in New Hampshire have it well-controlled, indicating no significant changes over the past several years.¹⁰ According to 2015 BRFSS data, in New Hampshire, about 25% of adults with asthma do not have it well controlled, while about 20%, or 1 in 5 adults, have very poorly controlled asthma. Poorly controlled asthma inflicts a greater burden on the patient through higher medication cost, healthcare utilization, and missed work days. There is still no cure for asthma, so efforts to increase the level of control among those with asthma can greatly impact the quality of life for patients and families.

FIGURE 6

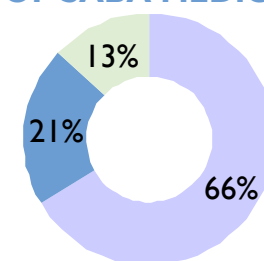
Percentage of Asthma Control Among Adults
Well Controlled, Not Well Controlled, Very Poorly



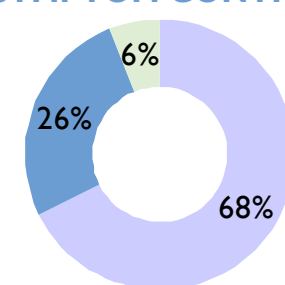
NIGHTTIME AWAKENINGS



USE OF SABA MEDICATION



SYMPTOM CONTROL



ASTHMA AMONG ADULTS - KEY FINDINGS

- According to BRFSS 13.2%, or approximately 143,000 adults in New Hampshire have asthma.
- The prevalence of asthma in adults in New Hampshire has significantly increased since 2015.
- Just over half (55%) of adults in New Hampshire with asthma have it well-controlled.

ASTHMA AND THE ENVIRONMENT

THE HOME

As outlined in the *Guidelines*, a key part of asthma management is the control of triggers, which can cause asthma attacks or worsen symptoms. Many common triggers are present in the home, and while every individual with asthma has different triggers, some are more widespread than others. **Figure 7** below displays the percentage of adults with asthma reporting common home triggers, according to the 2014-2015 BRFSS Asthma Callback Survey. As shown in **Figure 7** and **Table 4**, the most common home trigger present for adults with asthma is the presence of pets in the bedroom, followed by carpeting or rugs, which can trap dust and allergens in the room. On the other hand, a small percentage of adults with asthma in New Hampshire use gas appliances unvented or reported seeing rodents in their home in the last 30 days.

FIGURE 7

Adult Asthma Home Triggers, BRFSS ACB 2014-2015

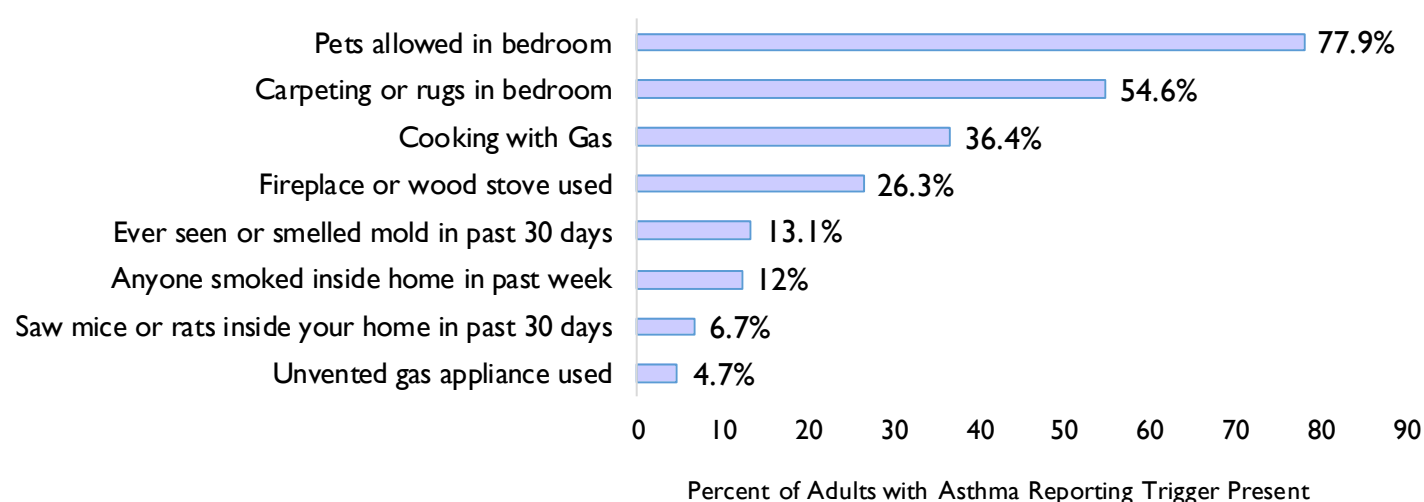


TABLE 4: Adult Asthma Home Triggers, BRFSS ACB 2014-2015

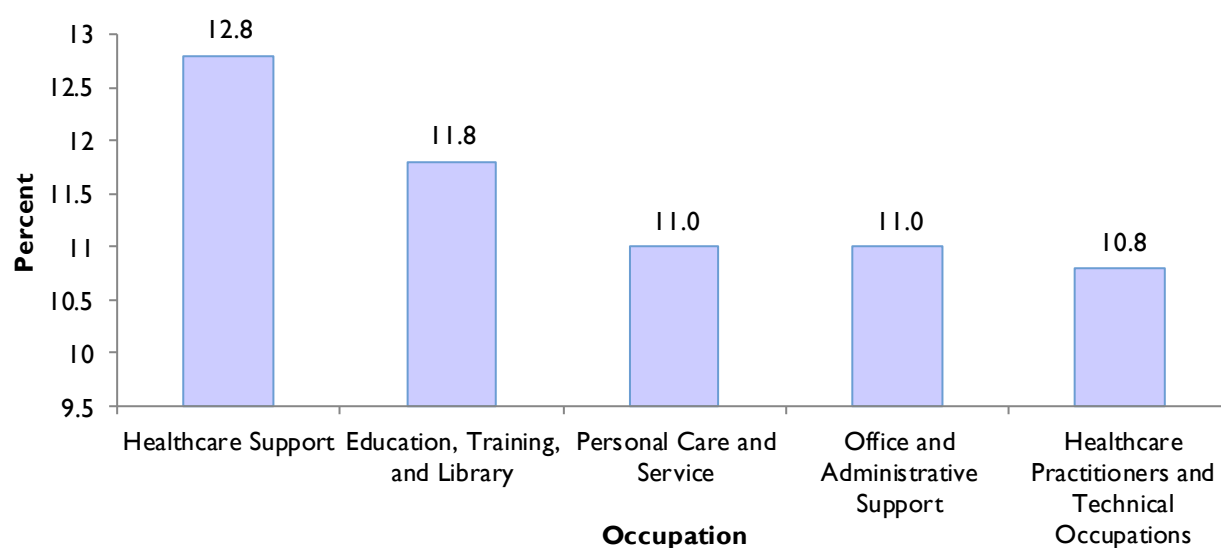
Asthma Home Trigger	Percent of Adults with Asthma Reporting	95% C.I.
Pets allowed in bedroom	77.9%	70.7%-85.0%
Carpeting or rugs in bedroom	54.6%	47.6%-61.5%
Cooking with Gas	36.4%	29.4%-43.3%
Fireplace or wood stove used	26.3%	20.2%-32.4%
Ever seen or smelled mold in past 30 days	13.1%	8.1%-18.1%
Anyone smoked inside home in past week	12%	7.1%-16.9%
Saw mice or rats inside your home in past 30 days	6.7%	4.1%-9.2%
Unvented gas appliance used	4.7%	2.3%-7.0%

THE WORKPLACE

An individual's occupation can exacerbate existing asthma, or lead to a new asthma diagnosis. In fact, in 2016, 13.5% of New Hampshire adults who had asthma and had ever been employed had been told by their healthcare provider that their asthma was work-related. This was the highest percent in the previous five years.¹¹ However, not all professions have the same rates of asthma; the prevalence of asthma is higher in certain occupations compared to others. For example 12.8% of BRFSS respondents who worked in Healthcare Support reported having asthma, while 11% of those working in Personal Care and Service reported the condition. Figure 8 represents the five occupations with the highest prevalence of asthma reported between 2012 and 2016.

FIGURE 8

Percent of Adults with Asthma in the Top 5 Asthma Prevalence Occupations, BRFSS 2012-2016



THE OUTDOOR ENVIRONMENT

In addition to a person's home and work environment, the outdoor environment affects asthma as well. A 2017 study found that emergency department visits for asthma increased significantly in the week following an extreme heat event, indicating high temperatures may lead to severe asthma exacerbations.¹² Climate can also interact with other outdoor asthma triggers, such as increasing pollen counts and potency, and worsening outdoor air quality through higher levels of particulate matter and ozone.¹³ These factors can pose challenges to individuals trying to manage their asthma.

ASTHMA AND THE ENVIRONMENT - KEY FINDINGS

- The most common home trigger reported by adults with asthma is pets in the bedroom.
- From 2012-2016, work-related asthma increased to 13.5%, or approximately 1 in 8 adults who have ever been employed in New Hampshire
- Asthma emergency department visits increase significantly after an extreme heat event.
- Changes in climate worsen with outdoor asthma triggers like pollen and extreme heat.

ASTHMA'S IMPACT

Asthma can threaten both a person's life and their quality of life. Not only can symptoms lead to death, they can also force individuals to adjust their (or their family's) lifestyle, from limiting physical activity to missing school or work due to asthma exacerbations. In 2017, 3,249 people across the nation died due to asthma, including sixteen (16) New Hampshire residents.¹⁴ Nationally, asthma is also the third leading cause of hospitalization among children younger than 15 years and one of the leading causes of school absenteeism. In 2013, an estimated 13.8 million school days were missed due to asthma.¹⁵

ASTHMA HOSPITALIZATIONS

Asthma is a significant cause of emergency department visits and hospitalizations, expensive and time-consuming ordeals for patients and families. Data on asthma emergency department visits included in this report are based on the New Hampshire Hospital Discharge Dataset, which uses diagnoses codes (ICD codes) to classify hospitalization and emergency department visits.¹⁶ According to this data, there are over 4,000 emergency department visits due to asthma each year in New Hampshire. As shown in **Figure 9** and **Table 4**, the age-adjusted rate of asthma Emergency Department visits declined between 2012 and 2016, the most recent data available. The use of age-adjusted rates indicates the decline is not due to any changes in age demographics

over the five-year period. It is important to note that the case definition changed in October of 2015 (from ICD-9 to ICD-10), meaning data from 2015 may not be comparable to other years.

TABLE 4: Asthma Emergency Department Visits Age-Adjusted Rates, NH HDD 2012-2016

Year	Age-Adjusted Rate, (visits per 10,000 population)	95% C.I.
2012	39.94	38.81-41.06
2013	36.40	35.30-37.50
2014	36.77	35.65-37.88
2015*	34.64	33.57-35.72
2016	33.72	32.66-34.78

*Change in ICD Codes

FIGURE 9

Asthma Emergency Department Visits, State Age-Adjusted Rate, NH HDD 2012-2016

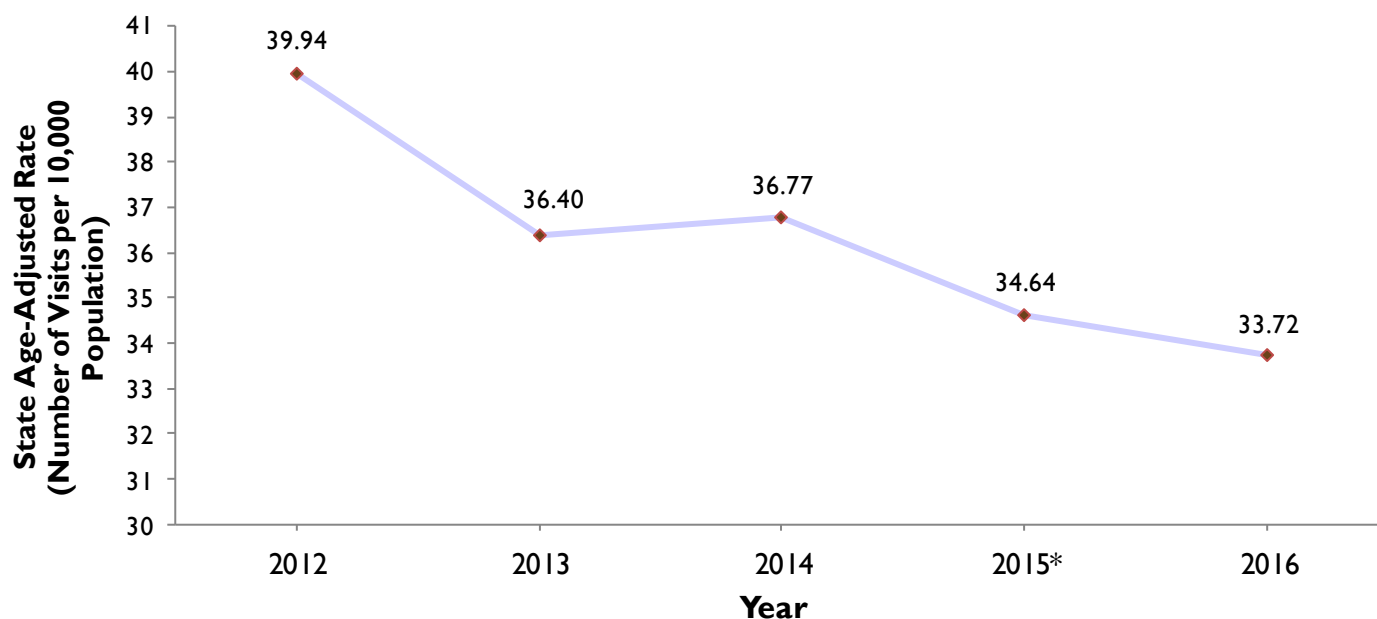


TABLE 5: Asthma Emergency Department and Inpatient Visit Rates by Sex and Age, NH HDD 2016

Age (years)	Emergency Department Visit Rate (per 10,000 population)		Inpatient Visit Rate (per 10,000 population)	
	Female Age-Specific Rate (95% CI)	Male Age-Specific Rate (95% CI)	Female Age-Specific Rate (95% CI)	Male Age-Specific Rate (95% CI)
0-4	46.7 (39.2-54.2)	76.4 (67.0-85.8)	6.0 (3.6-9.3)	11.2 (7.9-15.4)
5-9	38.1 (31.6-44.6)	62.7 (54.4-70.9)	4.4 (2.4-7.2)	6.2 (3.9-9.4)
10-14	20.9 (16.5-26.0)	30.4 (25.0-35.9)	1.3 (0.4-3.1)	2.5 (1.2-4.7)
15-19	35.7 (30.2-41.2)	21.2 (17.2-24.8)	3.1 (1.7-5.2)	0.9 (0.2-2.2)
20-24	45.1 (38.9-51.4)	41.8 (35.9-47.6)	3.4 (1.9-5.6)	1.7 (0.7-3.4)
25-29	61.0 (53.0-68.9)	39.9 (33.7-46.2)	3.2 (1.7-5.6.7)	1.5 (0.6-3.3)
30-34	59.5 (51.6-67.3)	38.8 (32.6-45.1)	2.4 (1.1-4.6)	1.8 (0.7-3.8)
35-39	53.8 (46.3-61.2)	32.2 (26.4-38.0)	3.5 (1.9-6.0)	2.2 (0.9-4.3)
40-44	49.9 (43.1-56.8)	23.4 (18.9-28.6)	5.8 (3.7-8.7)	3.2 (1.7-5.5)
45-49	34.9 (29.7-40.2)	23.7 (19.3-28.1)	3.1 (1.7-5.1)	2.8 (1.5-4.7)
50-54	23.7 (19.7-27.8)	13.8 (10.9-17.4)	3.8 (2.4-5.9)	0.9 (0.3-2.2)
55-59	26.9 (22.6-31.2)	10.5 (7.9-13.6)	3.2 (1.9-5.1)	1.7 (0.8-3.1)
60-64	19.5 (15.8-23.9)	8.8 (6.3-12.0)	4.2 (2.5-6.4)	0.9 (0.2-2.2)
65-69	16.6 (12.8-21.1)	8.7 (6.0-12.2)	4.8 (2.9-7.5)	0.3 (0.0-1.5)
70-74	17.3 (12.8-22.9)	10.5 (6.9-15.3)	4.6 (2.4-7.9)	0.8 (0.1-2.8)
75-79	12.8 (8.3-18.8)	9.7 (5.6-15.8)	5.1 (2.4-9.4)	1.2 (0.1-4.4)
80-84	12.2 (7.3-19.3)	2.8 (0.6-8.2)	4.1 (1.5-8.9)	1.9 (0.2-6.7)
85 plus	6.4 (3.3-11.2)	3.1 (0.6-9.2)	3.2 (1.2-7.0)	1.0 (0.0-5.8)

Figures 10 and **11**, as well as **Table 5**, depict the rate (per 10,000 population) of both asthma emergency department visits and asthma inpatient hospitalizations by age and sex in 2016. These data demonstrate that the risk of visiting the hospital for asthma varies depending on these two demographic factors. Among children, young boys (0-9 years) see higher rates of emergency department visits and inpatient hospitalizations. Among adults, women (25-44 years) have higher rates of emergency department visits and adult and older women (40-44 and 60+ years) are more at risk of inpatient hospitalizations. Note that these numbers include only patients treated in New Hampshire; New Hampshire residents treated out of state are not included in analysis.



FIGURE 10

Rate of Asthma Emergency Department Visits by Sex and Age, NH HDD 2016

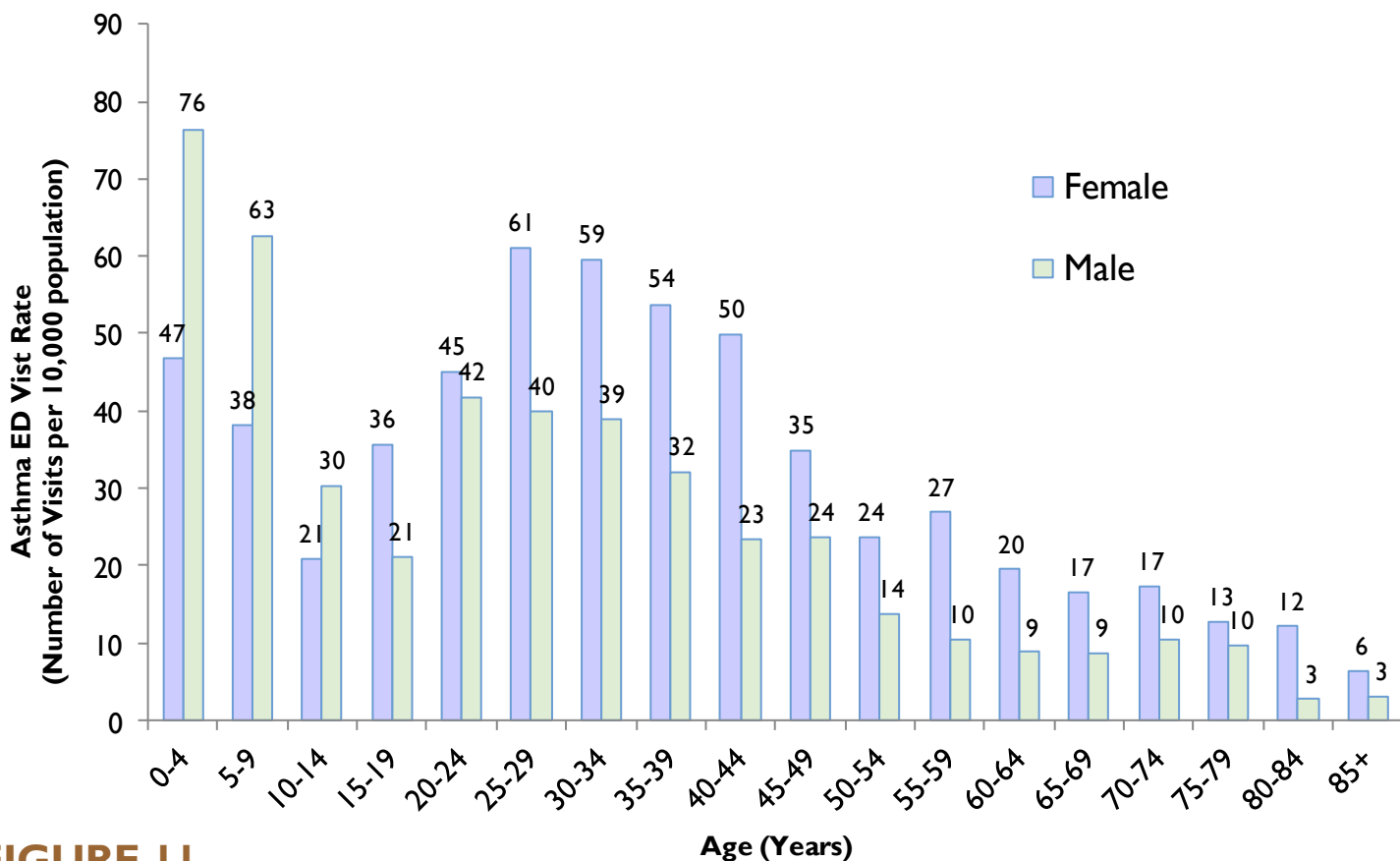
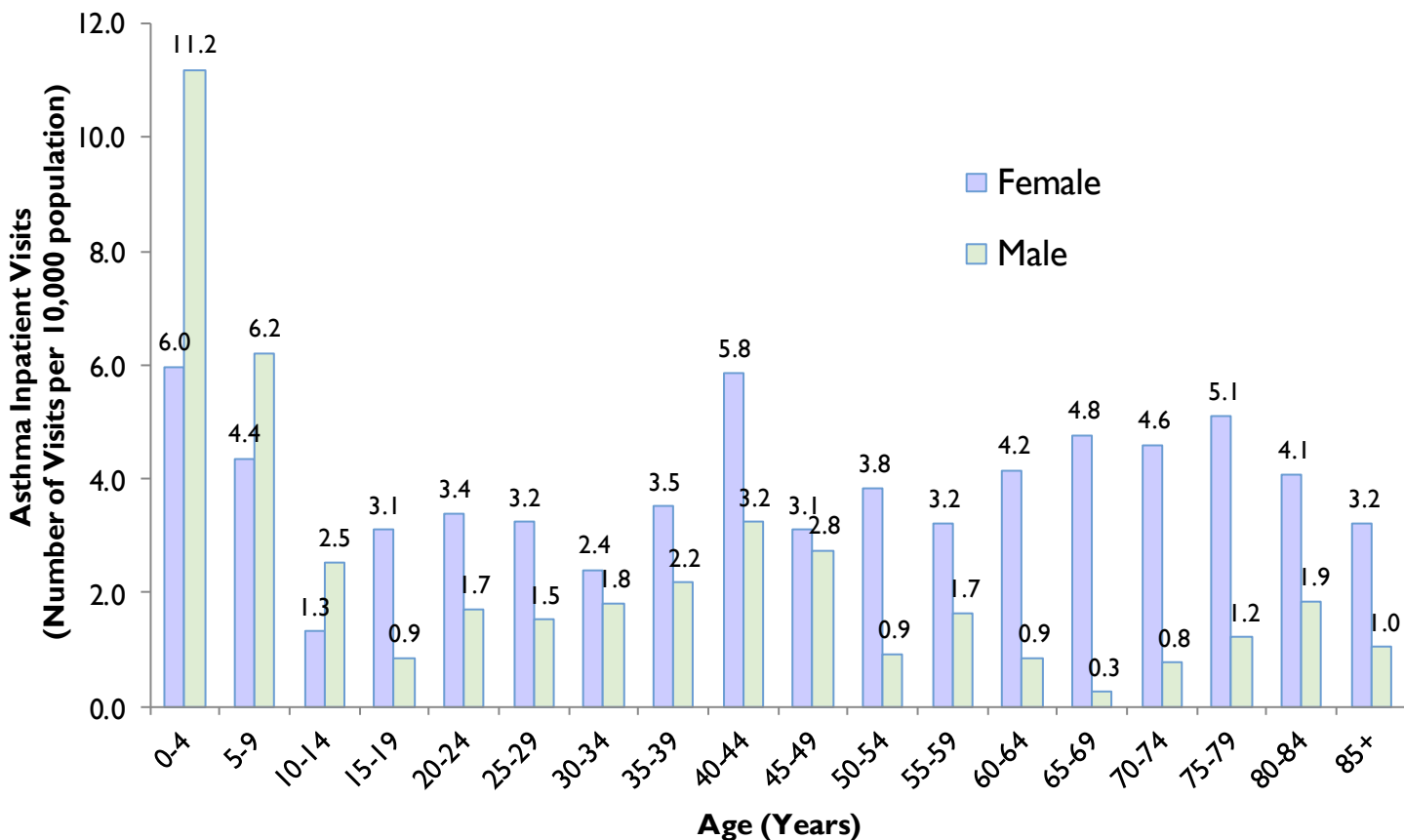


FIGURE 11

Rate of Asthma Inpatient Visits by Sex and Age, NH HDD 2016



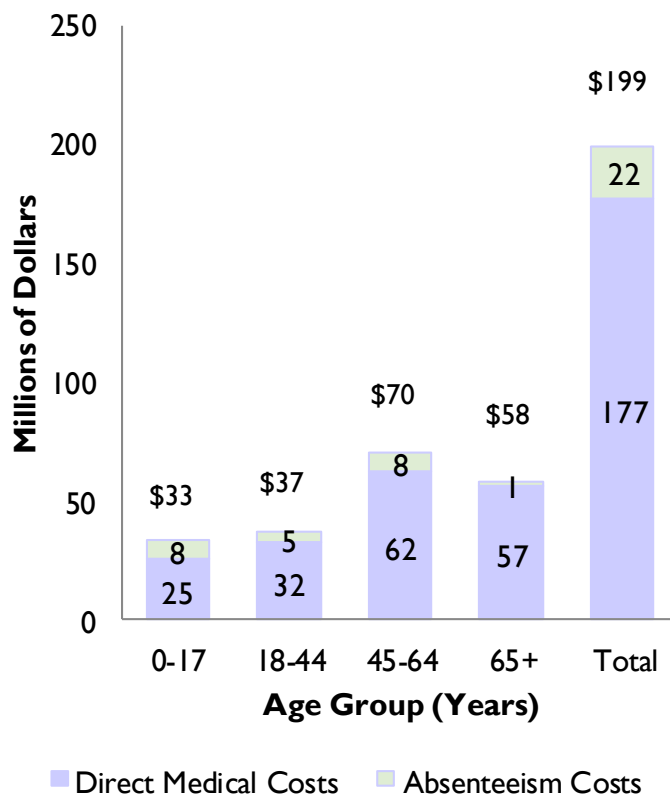
ASTHMA COSTS

Costs related to asthma are divided into two categories: direct medical costs (e.g. hospitalization, provider visits, medication) and absenteeism costs (missed wages due to work days spent dealing with asthma symptoms or caring for someone with asthma). In New Hampshire, across all age groups, approximately 110,000 days are missed from school or work each year, estimated by the Centers for Disease Control and Prevention’s (CDC) Chronic Disease Calculator.¹⁷ According to this tool, asthma costs New Hampshire approximately \$199 million each year. As shown in **Figure 12** and **Table 6**, this total is comprised of \$177 million in direct medical costs, and \$22 million in absenteeism.¹⁸ These figures also demonstrate the increasing cost of asthma with age. All costs were adjusted to 2018 dollars using the U.S. Bureau of Labor Statistics (BLS) Inflation Calculator.¹⁹

TABLE 6: Estimated Annual Costs Attributable to Asthma, CDC, BLS
(adjusted to 2018 dollars)

Age Group (Years)	Cost of Treatment per Person	Direct Medical Costs	Absenteeism Costs	Total Costs
0-17	\$1,018	\$25.4 Million	\$8.1 Million	\$33.5 Million
18-44	\$1,601	\$32.4 Million	\$4.6 Million	\$37.0 Million
45-64	\$2,768	\$62.4 Million	\$8.1 Million	\$70.5 Million
65+	\$5,559	\$56.7 Million	\$1.2 Million	\$57.8 Million
Overall	\$2,276	\$176.9 Million	\$22.0 Million	\$198.9 Million

FIGURE 12
Estimated Annual Costs of Asthma by Age and Type, CDC, BLS



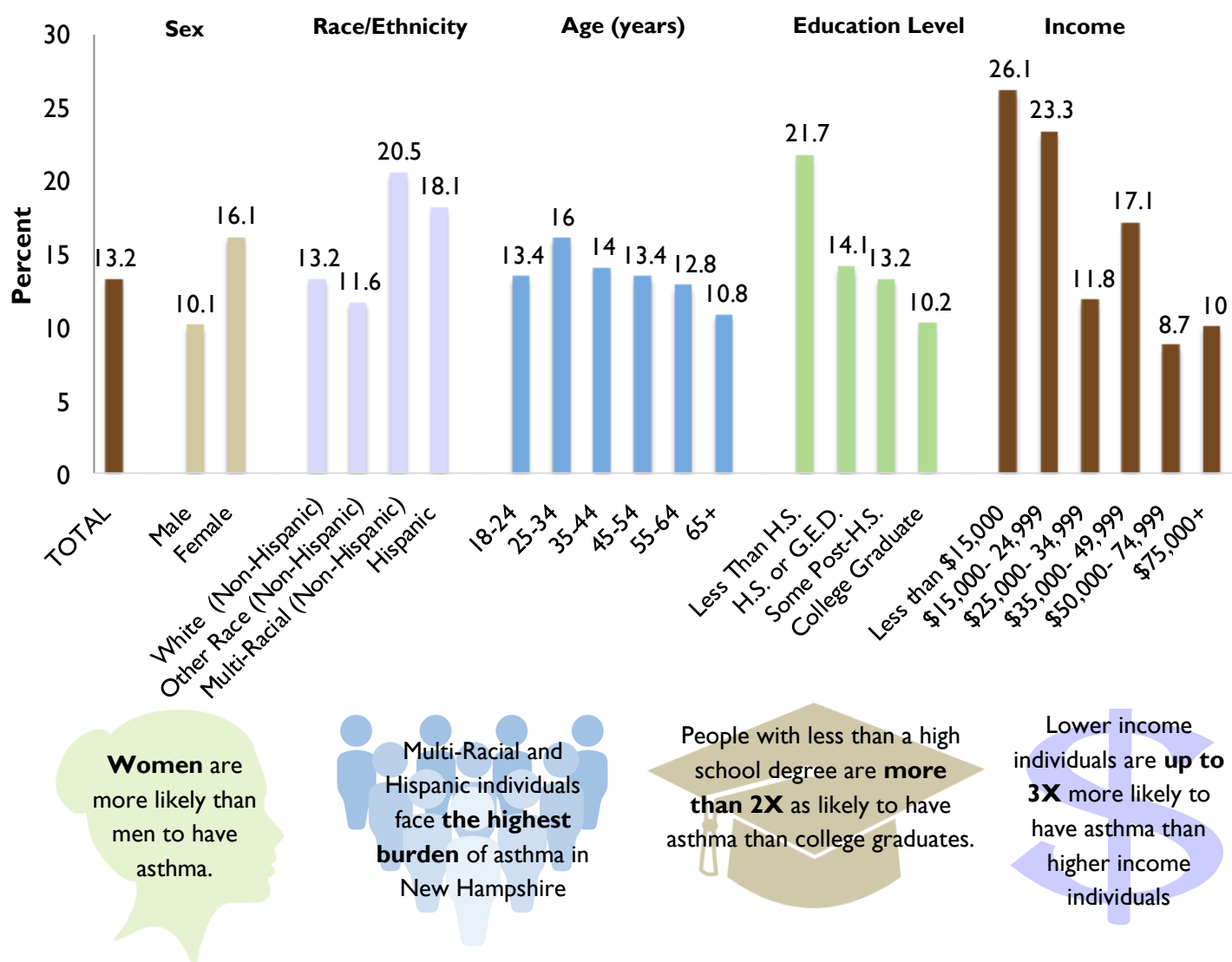
ASTHMA’S IMPACT - KEY FINDINGS

- The rate of asthma emergency department visits in New Hampshire is declining.
- Risk for an asthma emergency department visit or inpatient hospitalization is related to age and gender.
- In 2017, sixteen people died of asthma in New Hampshire.
- Asthma costs New Hampshire approximately \$199 million each year, comprised of \$177 million in direct medical costs and \$22 million in absenteeism costs.
- The cost of asthma increases with age.

ASTHMA DISPARITIES

The burden of asthma is not equally distributed; factors like sex, race/ethnicity, age, education, and income all impact a person’s risk of asthma. **Figure 13** below shows the burden of asthma across these categories.

FIGURE 13
Adult Asthma Prevalence Demographics, BRFSS 2017



Social and economic factors also impact access to care and ability to manage the condition. National data can help depict the disproportionate barriers to proper asthma management. According to the CDC, 1 in 4 Black adults and 1 in 7 Hispanic adults cannot afford routine medical care for their asthma. Additionally, 1 in 4 Black adults and 1 in 5 Hispanic adults report being unable to afford asthma medications. Overall, racial minorities are more likely to report cost as a barrier to care than their white counterparts.²⁰ It is important to note that these factors do not exist in a vacuum; when addressing asthma at a state and national level, they must all be taken into consideration to improve the lives of adults living with asthma.

Disparities exist not only in the prevalence and management of asthma, but also in its adverse outcomes. **Map 2** depicts age-adjusted asthma emergency department visit rates at a sub-county scale, demonstrating that some geographic areas have much higher rates compared to others others.²¹ Sub-county areas, or communities, are combinations of towns with a total population of about 20,000 people. In New Hampshire, this could be a county, a group of towns within a county, a single city, or a community within a larger city. For example, Coos County has a population of around 30,000, whereas some towns, such as Keene and Derry, are much larger. Concord, Manchester, and Nashua are large enough cities that they can be subdivided into communities with a population of approximately 20,000.



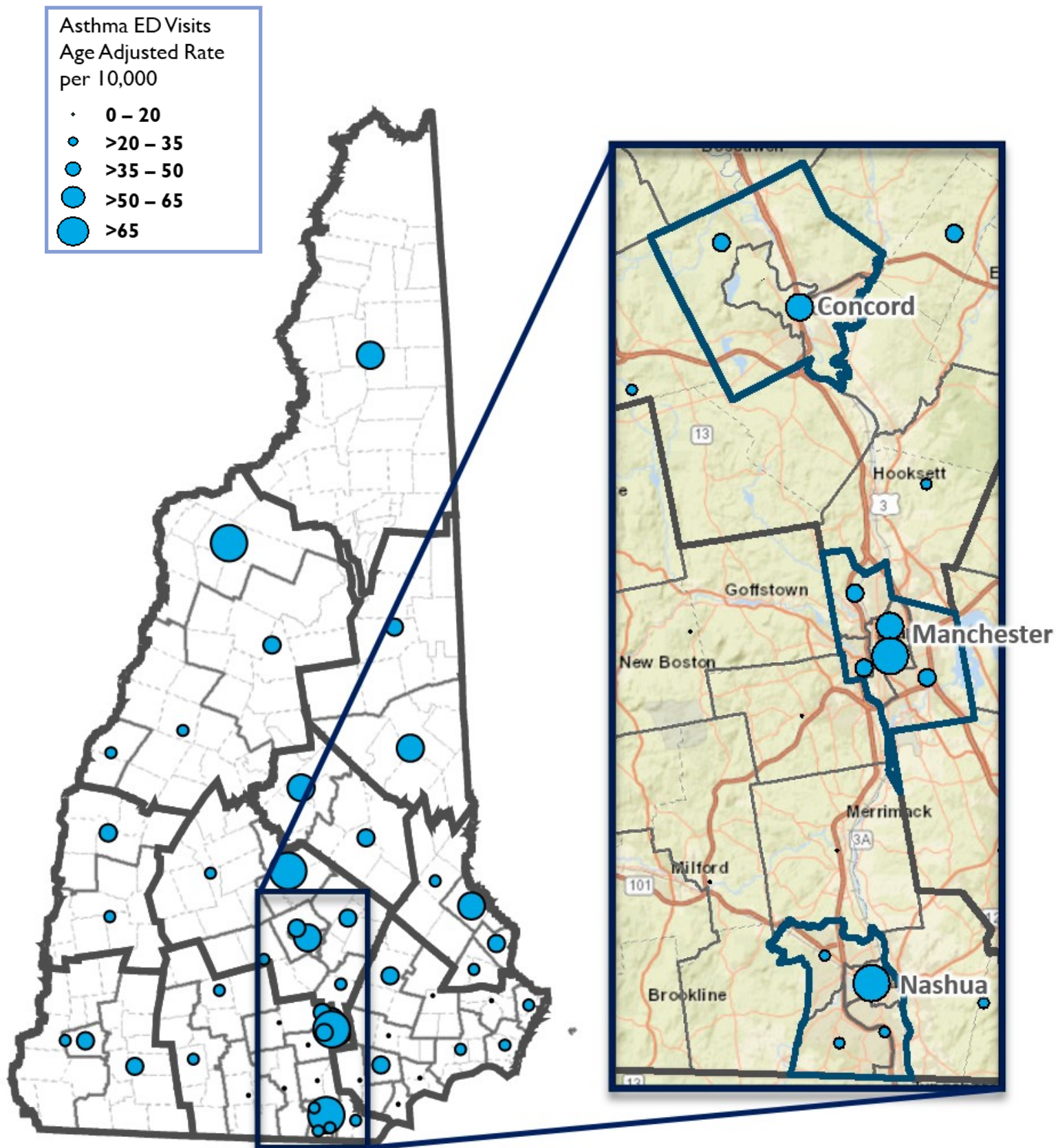
Deepening the discussion of disparity, **Map 3** represents this same asthma emergency department visit data overlaid on the Social Vulnerability Index (SVI).²² The SVI Score was developed to estimate the vulnerability of communities based on sixteen factors grouped into four categories: demographic, socioeconomic, transportation, and housing. The SVI is based on sixteen measures from the [US Census American Community Survey](#), including: poverty, unemployment, education, insurance status, disability, access to vehicles, and others. To create the SVI Score for each

community, each measure was ranked based on its value. If the community was in the top 10 percent, then a score of 1 was assigned. Community scores were summed across all measures. The higher the score, the more vulnerable the community, and the darker the color on the map.

Map 3 depicts a strong correlation between a high SVI Score (greater social vulnerability) and higher rates of asthma emergency department visits. To investigate which factors are more closely associated with a greater burden of asthma emergency department visits, linear regression models were run by the New Hampshire Environmental Public Health Tracking (EPHT) Program. This analysis found that communities with a higher percentages of poverty and higher percentages of people with disabilities experienced higher rates of asthma emergency department visits. Two other measures that were weakly associated with higher asthma rates were with were higher percentages of the population that speaks English “less than well” and higher percentages of the population living in group quarters, such as dormitories, nursing homes, and prisons. Recognizing that health is connected to a variety of social factors, these measures provide insight into the types of cross-cutting initiatives that may improve asthma management in New Hampshire. It is important to note that the data used to generate these maps only includes visits to hospitals in the state of New Hampshire. New Hampshire residents who visit hospitals in other states are not included. Because of this, some communities likely have higher rates than shown here, especially communities near Massachusetts, Vermont, or Maine, such as Salem, Hampstead, Atkinson, Plaistow, and the South Seacoast area.

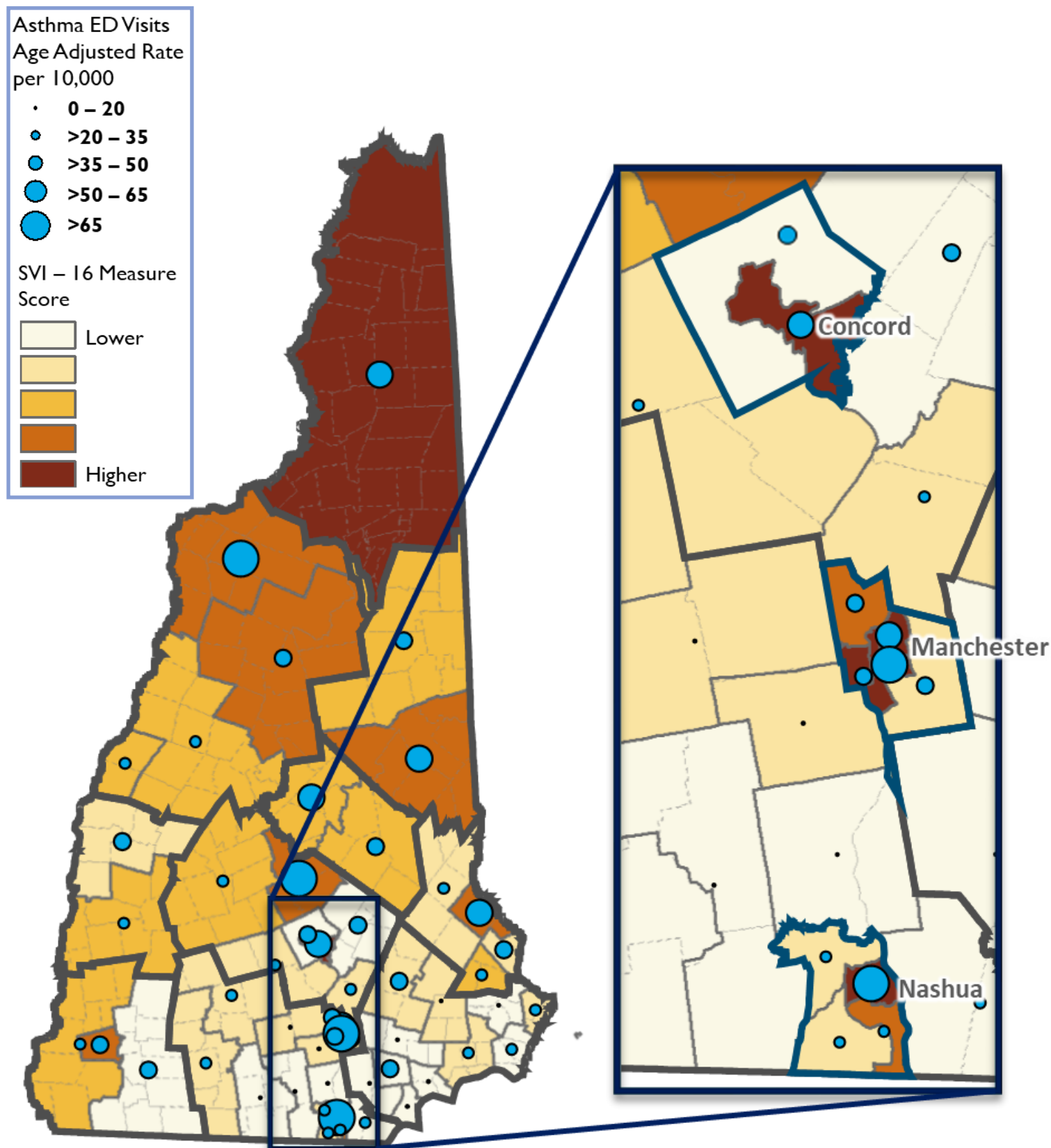
MAP 2

Asthma Emergency Department Visits Age-Adjusted Rate (Number of Visits per 10,000 Population) at Sub-County Level, NH HDD 2016



MAP 3

Asthma Emergency Department Visits Age-Adjusted Rate (Number of Visits per 10,000 Population) at Sub-County Level, Overlaid with Social Vulnerability Index (SVI), NH HDD 2016



Regardless of the limitations, these measures help emphasize the importance of recognizing the unequal distribution of asthma's burden in New Hampshire, and the importance of addressing the underlying social factors that may make certain communities more vulnerable to its effects.

ASTHMA DISPARITIES - KEY FINDINGS

- Sex, race/ethnicity, education, and income all impact an individual's risk of having asthma.
- Some communities in New Hampshire have much higher rates of asthma emergency department visits; these communities are often more socially vulnerable as determined by the Social Vulnerability Index.
- Social factors correlated with higher rates of asthma emergency department visits include: poverty, number of children in a community, disability, limited English, and living in group quarters.



GETTING INVOLVED

Given the alarming and unequal distribution of asthma in New Hampshire, the New Hampshire Asthma Control Program remains dedicated to reducing the burden of asthma in the state. Recognizing that asthma threatens both life and quality of life, the program aims to identify and understand populations living with asthma in the state, improve asthma management and education, and support community partners on the frontlines of asthma care. Through the New Hampshire Asthma Collaborative, the program brings together stakeholders from every level of asthma care to share resources and best practices, and to partner on cross-cutting initiatives. For more information about the Asthma Control Program, Asthma Collaborative, or asthma support in New Hampshire, e-mail asthma@dhhs.nh.gov.

LIST OF ACRONYMS

AAP	Asthma Action Plan
ACB	Asthma Callback
BLS	Bureau of Labor Statistics
BRFSS	Behavioral Risk Factor Surveillance System
CDC	Centers for Disease Control and Prevention
CI	Confidence Interval
ED	Emergency Department
NH	New Hampshire
NH HDD	New Hampshire Hospital Discharge Data
NHLBI	National Heart, Lung, and Blood Institute
ICD	International Classification of Diseases
SABA	Short-Acting Beta Agonist
SVI	Social Vulnerability Index
YRBSS	Youth Risk Behavior Surveillance System

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